

AMENDMENTS TO THE SPECIFICATION

Please amend the paragraph at page 3, lines 4 to 17 as follows:

According to the aforementioned objectives of the present invention, the present invention provides a LED comprising: a semiconductor layer of a first polarity; an active layer located on the semiconductor layer of the first polarity; and a semiconductor layer of a second polarity located on the active layer, wherein at least one side of at least the active layer and the semiconductor layer of the second polarity has a wave-shape border in a top view of the LED~~is of irregular shape~~, thereby reducing the probability of reflecting light emitted from the active layer, thus making the light emitted from the active layer penetrate through the at least one side and be emitted outside the LED. Moreover, the wave-shape border~~irregular shape~~ of the aforementioned side in the top view of the LED can be triangular wave-shape border~~triangle~~, semicircular wave-shape border~~semicircle~~, or parabolic wave-shape border~~parabola~~, etc. Furthermore, at least the active layer and the semiconductor layer of the second polarity therein further have at least one valley penetrating from an upper surface of the semiconductor layer of the second polarity to a lower surface of the active layer, thereby increasing an efficiency of emitting the light emitted from the active layer to the outside of the LED.

Please amend the paragraph at page 3 line 18 to page 4 line 8 as follows:

According to the aforementioned objectives of the present invention, the present invention provides another LED comprising: a semiconductor layer of a first polarity; an active layer located on the semiconductor layer of the first polarity; and a semiconductor layer of a second polarity located on the active layer, wherein at least one side of at least the active layer and the semiconductor layer of the second polarity therein has an uneven surface~~further have at least one valley penetrating from an upper surface of the semiconductor layer of the second polarity to a lower surface of the active layer, thereby increasing an efficiency of emitting the light emitted from the active layer to the outside of the LED.~~ Moreover, the at least one side of at least the active layer and the semiconductor layer of the second polarity ~~is of irregular shape~~, thereby reducing the probability of reflecting the light emitted from the active layer, thus making light emitted from the active layer penetrate through the at least one side and be emitted

outside the LED. Furthermore, the ~~uneven surface~~irregular shape of the aforementioned side ~~in the top view of the LED~~ has a wave-shape border, and the wave-shape border in the top view of the LED can be triangular wave-shape border~~triangle~~, semicircular wave-shape border~~semicircle~~, or parabolic wave-shape border~~parabola~~, etc.

Please amend the paragraph at page 4, lines 9 to 22 as follows:

According to the aforementioned objectives of the present invention, the present invention provides a method of making a LED, comprising: providing a semiconductor layer of a first polarity; forming an active layer on the semiconductor layer of the first polarity; and forming a semiconductor layer of a second polarity on the active layer, wherein at least one side of at least the active layer and the semiconductor layer of the second polarity has a wave-shape border in a top view of the LED~~is of irregular shape~~, thereby reducing the probability of reflecting the light emitted from the active layer, thus making light emitted from the active layer penetrate through the at least one side and be emitted outside the LED. Moreover, the wave-shape border~~irregular shape~~ of the aforementioned side in the top view of the LED can be triangular wave-shape border~~triangle~~, semicircular wave-shape border~~semicircle~~, or parabolic wave-shape border~~parabola~~, etc. Furthermore, at least the active layer and the semiconductor layer of the second polarity therein further have at least one valley penetrating from an upper surface of the semiconductor layer of the second polarity to a lower surface of the active layer, thereby increasing an efficiency of emitting the light emitted from the active layer to the outside of the LED.

Please amend the paragraph at page 4 line 23 to page 5 line 13 as follows:

According to the aforementioned objectives of the present invention, the present invention provides another method of making a LED comprising: providing a semiconductor layer of a first polarity; forming an active layer on the semiconductor layer of the first polarity; and forming a semiconductor layer of a second polarity on the active layer, wherein at least one side of at least the active layer and the semiconductor layer of the second polarity therein has an uneven surface~~further have at least one valley penetrating from an upper surface of the semiconductor layer of the second polarity to a lower surface~~

~~of the active layer~~, thereby increasing an efficiency of emitting the light emitted from the active layer to the outside of the LED. Moreover, the at least one side of at least the active layer and the semiconductor layer of the second polarity has a wave-shape border in a top view of the LED~~is of irregular shape~~, thereby reducing the probability of reflecting the light emitted from the active layer, thus making light emitted from the active layer penetrate through the at least one side and be emitted outside the LED. Furthermore, the uneven surface~~irregular shape~~ of the aforementioned side in the top view of the LED has a wave-shape border, and the wave-shape border in the top view of the LED can be triangular wave-shape border~~triangle~~, semicircular wave-shape border~~semicircle~~, or parabolic wave-shape border~~parabola~~, etc.

Please amend the paragraph at page 6 line 9 to page 7 line 12 as follows:

The present invention relates to a LED having a side of irregular shape and a method of making the LED. Please refer to FIG. 2A showing the top view of the LED according to an embodiment of the present invention, and to FIG. 2B showing the side view of the LED according to the embodiment of the present invention simultaneously. A LED 180 shown in FIG. 2A and FIG. 2B can be formed via the following steps. Firstly, a substrate 110 is provided, wherein the material of the substrate 110 is such as sapphire, GaN, AlN, etc. Then, a semiconductor layer 130 of a first polarity, an active layer 140, a semiconductor layer 150 of a second polarity, and a contact layer 155 are sequentially epitaxially grown on the substrate 110, wherein the semiconductor layer 130 of the first polarity and the semiconductor layer 150 of the second polarity can be made of GaN, etc., and the active layer 140 can be made of InGaN, etc. Afterwards, in a photolithography process, a mask having pattern of triangular sides 190 is used to define the portion needed to be removed in the subsequent etching process. Then, reactive ion etching (RIE) etc. can be used to remove a portion of the contact layer 155, the semiconductor layer 150 of the second polarity, and the active layer 140 outside the triangular wave-shape borders~~sides~~ 190 orderly from top to bottom, thereby exposing a portion of the upper surface of the semiconductor layer 130 of the first polarity. At the same time, if the etching time is long enough, a portion of the thickness of the semiconductor layer 130 of the first polarity can be further removed in this etching process, thereby

forming the side view of the contact layer 155, the semiconductor layer 150 of the second polarity, the active layer 140, and the semiconductor layer 130 of the first polarity, such as shown in FIG. 2B. Afterwards, an electrode 160 of the first polarity and an electrode 170 of the second polarity are deposited respectively on the exposed portion of the semiconductor layer 130 of the first polarity and the contact layer 155 via thermal evaporation, e-beam evaporation, or sputtering, etc. It is worthy to be described that both the first polarity and the second polarity mentioned in the present invention are mutually opposite in polarity. For example, the second polarity is N type while the first polarity is P type; the second polarity is P type while the first polarity is N type.

Please amend the paragraph at page 7, lines 13 to 25 as follows:

The present invention is featured in that the contact layer 155, the semiconductor layer 150 of the second polarity, and the active layer 140 (even including a portion of the semiconductor layer 130 of the first polarity) shown in FIG. 2A and FIG. 2B have triangular wave-shape bordersides 190 in the top view of the LED 180. The pattern having triangular wave-shape bordersides 190 can be defined by using the same mask used in the photolithography process before the aforementioned etching process. Moreover, the deformed dimension of the triangular wave-shape bordersides 190 is greater than the equivalent emitting wavelength of the LED 180; and the incident angle of the light emitted from the active layer 140 to the triangular wave-shape bordersides 190 is less than the reflective critical angle of the triangular wave-shape bordersides 190. Consequently, with the use of the LED 180 having the triangular wave-shape bordersides 190 and the method of making the same, the probability of reflecting the light emitted from the active layer 140 by the triangular sides 190 can be reduced, thereby making light emitted from the active layer 140 penetrate through the triangular wave-shape bordersides 190 and be emitted outside the LED 180.

Please amend the paragraph at page 8, lines 1 to 18 as follows:

In addition, the contact layer 155, the semiconductor layer 150 of the second polarity, and the active layer 140 (even including a portion of the semiconductor layer 130 of the first polarity) in

the present invention further have at least one vertical injection valley. Please refer to FIG. 3A showing the top view of the LED according to another embodiment of the present invention, and to FIG. 3B showing the cross section viewed along the a-a' line in FIG. 3A. As shown in FIG. 3A and FIG. 3B, the contact layer 155, the semiconductor layer 150 of the second polarity, and the active layer 140 (even including a portion of the semiconductor layer 130 of the first polarity) therein have a valley 202, a valley 204, a valley 206, and a valley 208, etc. penetrating from an upper surface of the contact layer 155 to a lower surface of the active layer 140 and reaching into a portion of the semiconductor layer 130 of the first polarity, even penetrating the whole thickness of the semiconductor layer 130 and reaching to an upper surface of the substrate 110, thereby increasing an efficiency of emitting the light emitted from the active layer 140 to the outside of the LED 180. Besides, the shape of the inner surface of the valley 202, that of the valley 204, that of the valley 206, and that of the valley 208, etc. are not limited; and certainly the wave-shape bordersides of irregular shape, such as the triangular wave-shape bordersides 190, can be also adopted for further reducing the opportunity of reflecting the light.

Please amend the paragraph at page 8, lines 19 to 23 as follows:

Furthermore, the wave-shape borderirregular shape of LED's side is not limited to triangular wave-shape bordertriangle. As shown in FIG. 4, the elements (such as the contact layer 155) of the LED 180 etc. can also be the side of other shapes, such as semicircular wave-shape bordersides 210 or parabolic wave-shape borderparabola, etc. ~~The side of a~~Any shape wave-shape border is within the claimed scope of the present invention provided that the probability of totally reflecting the light by the side can be reduced.

Please amend the paragraph at page 20, lines 3 to 8 as follows:

A light emitting diode (LED) and a method of making the same are disclosed. The LED of the present invention comprises a semiconductor layer of a first polarity, an active layer, and a semiconductor layer of a second polarity stacked from bottom to up, wherein at least the active layer and the semiconductor layer of the second polarity have a side with a wave-shape border in a top view of the

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LED of irregular shape and/or at least one valley, thereby increasing the efficiency of emitting the light to the outside of the LED.